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AUTHOR Jorgensen, Joseph; Schroeder, Marlene
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ABSTRACT

This learner's guide is designed to assist middle school students in studying freshwater organisms. Following a brief introduction to freshwater ecology, simple line drawings facilitate the identification of plants and animals common to Florida's freshwater ecosystems. Emphasis of the short text which accompanies each illustration is upon the organism's appearance and habitat. A supplementary set of slides depicting some of the plants and animals discussed is available. (WB)

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Roger Weaver, Superintendent
John H. Headlee,
Environmental Education Contact

"INHABITANTS OF THE FRESH-WATER COMMUNITY"

JUNE, 1977

Written by
Joseph Jorgensen - Science Teacher
and
Marlene Schroeder - Reading Teacher
Inverness Middle School
1950 U.S. 41 North
Inverness, Fl. 32650

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Do Not Film This Page

FORWARD

As the authors have mentioned, this guide is only a beginning. Still, it can be useful if the user will sketch the unlisted organisms on the blank pages provided and will identify them using supplemental aids such as the Bantan Golden Nature Series Guides sold in many bookstores, news stands, and in tourist attractions such as Homosassa Springs Attraction (which carries the full line).

Field study activities need to be expanded considerably, but excellent supplementary materials are available in the state-adopted paper back text, "A Guide to the Study of Freshwater Ecology" edited by William A. Andrews, published by Prentice Hall, Inc.

The set of slides developed to accompany this guide are available from our Educational Media Center and will prove very useful in supplementing this guide.

Anyone wishing to revise this guide for future publication by adding additional material should contact the Citrus County Science Coordinator.

J.H.

USER INFORMATION

This guide was set up to acquaint the student with the biotic part of the fresh water environment. The guide was set for Middle School students and only deals with the more common organisms that can be found in our locale.

The students will no doubt find organisms which are not discussed in this guide. Students should be encouraged to describe and draw a picture of any of these organisms. I will include a list of reference materials which will help in identifying these "unknown" organisms. If you come across one you cannot identify, you can find a number of reference people in the Citrus County Guide to Reference People. I have found all the people in this area extremely helpful.

This guide can be taught along with or separate from a classroom ecology unit. Most of the material can be covered in the classroom as well as in the field. Students are more than happy to bring in samples from near their homes of lake and stream waters. If you take bottom samples I suggest including some bottom vegetation and leaving them sit overnight. The samples can then be observed through a magnifying glass the next day. Collect some water hyacinths growing close to shore. Examination will reveal many of the smaller animals including fishes, leeches and amphipods. Setting up an aquarium to include local organisms at the beginning of the year is a good idea. Let students observe and record changes over the year. This material may be helpful when setting up food chains.

Encourage students to use the guide in their own explorations into the freshwater environment around their homes. This type of practical knowledge is priceless.

The following pages are supplied for the purpose of listing and drawing all the organisms you found in your research. Please draw and describe all the organisms you find which are not found in this guide. Your teacher will help you determine what they are. The additions you make will help make this guide complete.

ENERGY AND THE ENVIRONMENT

INTRODUCTION

Three quarters of the earth is covered with water. Two thirds of our bodies are water. Water is one of the most abundant compounds that exist, without it life as we know it would cease to be. We use water for drinking, to wash our clothes and our bodies, to water crops, feed our animals, supply us with food, and the list could go on forever. Most of the water that covers the earth has salt in it and is unfit for us to drink. Much of the water that does not contain salt has been polluted by man's carelessness and is also unfit to drink. We can use this water for other things or we can clean it. Nature has its own ways of cleaning water. When water evaporates (drys-up) from a puddle in the road and then, in a cooling process falls to the earth as rain, it has been cleaned by nature. Nature cleans water and returns it to rivers and lakes and finally to the sea. The water which nature puts in its rivers and lakes is used by such a multitude of plants and animals that a classroom full of books couldn't hold their names. Citrus County is dotted with lakes and criss-crossed by rivers. If you live here you can't live far from water.

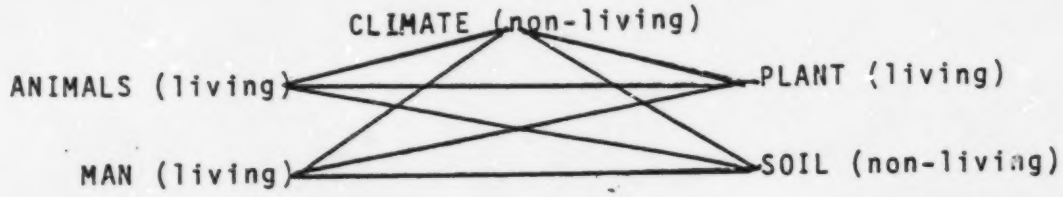
These lakes and streams play a large part in the balance of nature in this area. We all drink it, swim in it, and many of us fish in it, so we want to keep it clean. Natures' own methods for keeping it clean do not work when man enters the picture and builds homes and cities. Man upsets nature's balance. When this is upset it has to be corrected and this creates problems.

In order to understand the problems, we have to know something about the fresh water environment. We should know some of the plants and animals and their relationships. I hope the information in this guide will help you in your search for this understanding.

THE ECOSYSTEM

We have all seen pictures of the earth taken from the moon. These pictures show our home planet as being very beautiful. Our trips to the moon and now our spaceships traveling to Mars show this beautiful planet as being the only one with any active life-forms. We seem to be an island of life traveling through a lifeless desert of space. The study of this island of life (earth) is called ecology.

As we already should know every living thing on earth is dependent on may other living and non-living things. This dependence if described, would form a web or system. We would call this system an ecosystem. An ecosystem may look like this for man.



Let's go a little farther and take out of the ecosystme the non-living and just leave the living.

Now, if we give the animals and plants names, we can develop a food web.

Let's look at our food web. The rabbit gets his energy from the grass; the cow gets his energy from the grass; the deer gets his energy from the grass. Man gets his energy from the rabbit, deer, or cow, who received it from the grass. Hence, the man received his energy <u>in</u>directly from the grass.

Where did the grass receive its energy? Grass like all plants are able to trap the energy from the sun and store it in the form of food. Since the plants <u>produce</u> food we call them the <u>producer</u> and since the others <u>eat</u> this food we call them the consumers.

Every food web must have a producer. If we take the plants, such as grass, from our food web, the other animals would have no place to get their energy and would die. Without a food <u>producer</u> there can be no food <u>consumer</u>.

7

WHAT DO WE FIND IN THE FRESHWATER ENVIRONMENT

I PLANTS

In the freshwater environment there are three different types of plants, (1) the submersed, (2) the floaters, and (3) the emergents.

The submersed plants are all those which have to remain under water to stay alive. This plant group is the most important as a food source of animal life. In this group we find microscopic algae which is the basic food of the smaller pond animals. We also find larger underwater weeds such as elodea and milfoil, which are eaten by larger animals such as worms and 150 pound snapping turtles.

The floating plants include the water hyacinth and duckweed. These plants are not an important food source but they do provide homes for many small animals. The next time you are on the lake, pick up a water hyacinth and look at all the animals living in its roots.

The emergent plants include the water lilies, the cattail, and the sawgrass. Most Floridians have seen the large leaves of the water lilies or have cut their hands on the sharp edges of the saw grass.

II ANIMALS

A. The invertebrate group consist of the worms, mollusk, protozoans, and arthropods.

The protozoans are microscopic so they cannot be seen without a microscope. Every drop of water contains hundreds of these tiny animals. They feed on algae, dead plants, and animal remains. They are the first consumers in many food webs. When you look at a drop of pond water under the microscope you will see many protozoa swimming rapidly through the water. You will be asked to find two common ones, the amoeba and paramecium.

The worms which can usually be found on the submersed plants or in the bottom muds come in many shapes and sizes. These animals are easily found just by taking a bottom sample and letting it sit over night. The worms will usually come to the surface of the mud. When collecting be sure not to overlook the almost clear planarian which hides on the underside of leaves.

The mollusk group has two types of members living in fresh water, the bivalve and univalve. The bivalve, or two shelled member, is the mussel or fresh water clam. The univalve, or one shelled animal, is the snail. The mussel is a filter feeder and strains food from the water. In this way it becomes part of nature's cleaning system. The snail becomes part of the food web by being eaten by some of our water birds. If you see a dock which has many snail shells on it, watch it

for awhile and you will probably see a heron bring the snails to the dock and eat the flesh, leaving the shell.

Arthropods are animals with hard outer coverings and jointed legs. They are probably the most abundant macroscopic (able to see with your eye) group found in fresh water. We will study two types, the crustaceans and the insects.

The crustaceans, which goes from the very small ostracod to the larger crayfish, are fed upon by almost all your higher fishes. Even the plant bladderwort has developed little "traps" for catching these animals. These are the animals that you can find swarming all over the roots of the hyacinth.

The insects are a varied group. Some spend their whole life in water and others, like the mosquito, spend only part of their lives in water. Some insects go through changes in their life cycle. For instance, the adult midge looks like a mosquito but the young midge looks like a worm. You will study many insects whose young you will not recognize. Just remember these insects change as they get older. Insects play a very important part in the food web. The next time you are near a lake or stream and see a fish jump he was probably eating an insect.

B. The vertebrate animals are made up of our higher more advanced animals. The groups you are going to study are fish, amphibian, reptiles, birds, and mammals.

The fish are probably our best known group because we all like to fish. We will study some of the more common forms from the guppy-like mosquito fish to the large gar.

The amphibians are animals which spend some of their lives in water. They do not have scales to hold in body moisture so they have to live in or near water to keep from drying out. Many amphibians are found locally but we will study two common ones...the newt or salamander, and the bull frog.

The reptiles have scales like the fishes and have hard or leathery hides. The alligator is the only lizard-like water reptile we have to study. He plays an important role in the food web by cleaning up dead plants and animals and controlling some fish populations. We have many different types of turtles in the area and we will study the most common. The snakes are represented by two non-poisonous and one poisonous. The turtles feed on both plants and animals and the snakes feed only on small animals including fish.

We will study three types of birds, (1) the wading birds, (2) ducks, and (3) hawks. The wading birds are well represented in our area and it is difficult to travel past a body of water without seeing these beautiful animals. They have long legs which enable them to wade out into the water in search of food.

The ducks, for the most part, are winter visitors. The many different kinds that come here would be hard to identify. I have chosen the coot to study because he is, in many cases, a resident

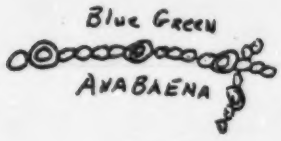
of our area. We do have one duck-like bird which many of you have seen drying his wings along the river. He is the water turkey. The water turkey looks like a large duck with a long neck. He is an excellent swimmer. We have only one resident hawk in our area - the osprey. The osprey feeds only on fish and dives beneath the water to catch them.

The two mammals which feed and spend much time in or near the water are the raccoon and the otter. These two feed in or along our lakes and rivers and in many cases are the top consumer in their food web.

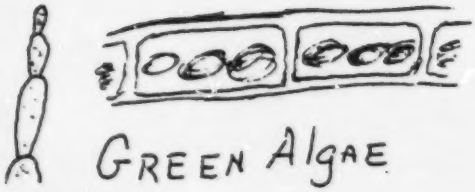
Now that you have some background and know a little about what to look for, read the descriptions of the plants and animals that follow. Then go out to a lake or river and try to find these things in their natural environment. You will have to take some bottles with you and collect some samples of water, mud, and plants in order to do your microscopic examinations. Try to develop your observation skills and, have fun!

SUBMERSED PLANTS

Common Algae



Blue-green algae are celled balls which form chains and float in the water. Floating masses can be seen with the eye but to see the single cell a microscope must be used. The algae if found in large numbers may cause the water to smell bad.



Green algae grows in long threads one cell thick and can be seen attached to rocks and seawalls when the water levels are low. When there is a lot of this algae it will break off its base and float on the surface, forming a thick green slime.

Elodea grows rooted to the bottom and has long branching stems with short small points on the stem-like little propellers. There are two types of elodea found in this area.

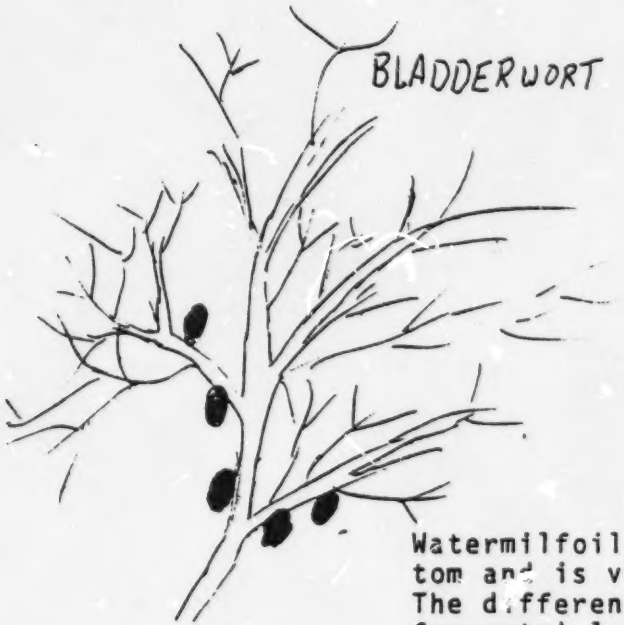
a. The first, Brazillian Elodea, is used as a common aquarium plant and has four to eight leaves growing out of each point on the stem. The leaves are soft with smooth edges. This elodea is larger than the second type.
b. Florida Elodea or hydrilla has three leaves growing out of each point on the stem. The stems are thin and easily broken. The leaves are hard and have tooth-like edges.

Both elodea cause problems for us by clogging our boat motors and stopping the flow of our rivers and streams.

Water silk

Water silk - spirogyra - grows in a large cottony mass and floats on the surface of the water. If you try to pick it out of the water it will form a long thread. In large amounts the algae forms a green slime on top of the water much like the green algae.

Common bladderwort can be found floating just below the surface since it has no roots to anchor it to the bottom. The stems can be 2-3 m. long and the leaves are feathery with many small pods (balls) attached to them. These pods trap and digest small animals.



BLADDERWORT

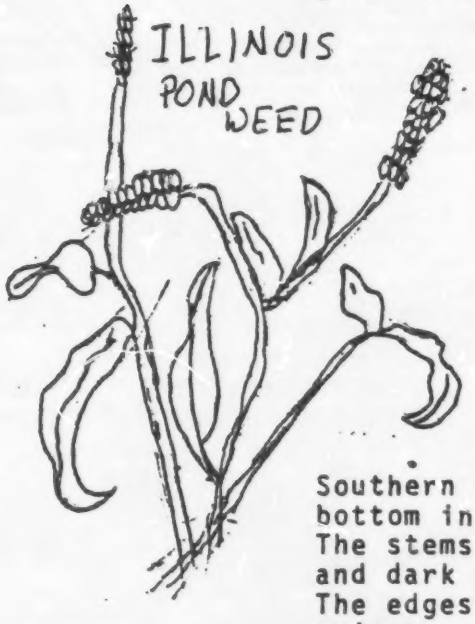
Watermilfoil grows rooted to the bottom and is very similar to fanwort. The difference is in the leaves. The fanworts' leaves are shaped like fans and the milfoils' are shaped like flat feathers.

WATERMILFOIL

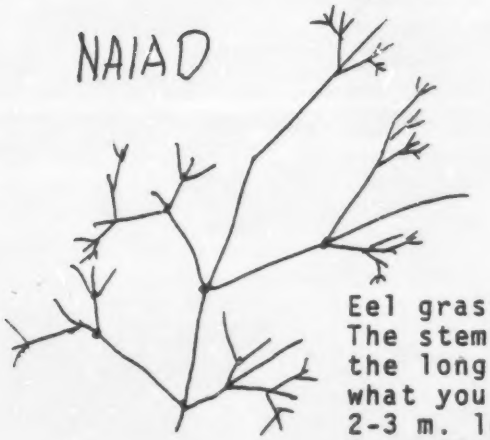
Coontail can be found floating just below the surface. It has long stems with many branches. The short needle-shaped leaves are very crowded at the ends of the branches which is how the plant gets its name.

Fanwort grows rooted to the bottoms of slow-moving lakes and streams. The stems of the fanwort are long and slender and covered with a clear jello-like substance. The leaves are small and shaped like little fans.

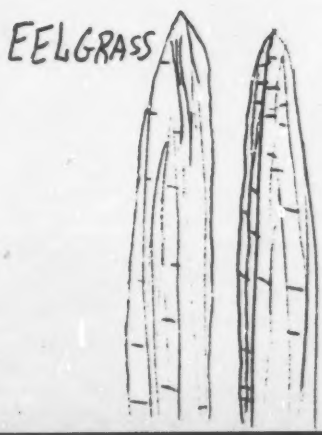
Illinois pond weed grows rooted to the bottom of lakes and streams. The stem is strong and sometimes grows through the mud producing new plants as it grows. The leaves, which are 5-13 cm. long, are light green and have wavey edges.



Southern naiad grows attached to the bottom in shallow lakes and streams. The stems and leaves are long, slender and dark green or greenish purple. The edges of the leaves have small spines.



Eel grass grows rooted in the mud. The stems are found underground and the long ribbon-like green leaf is what you see. The leaves can be 2-3 m. long and when the water is low, float on the surface.



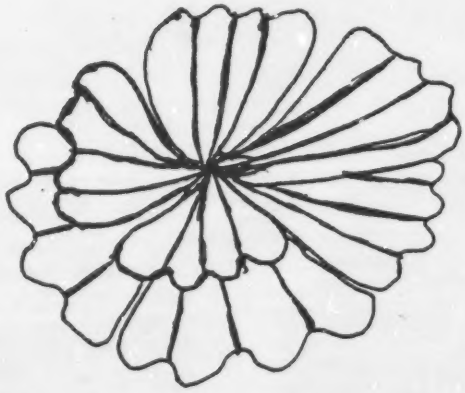
FLOATING PLANTS

WATER HYACINTH

Water hyacinth is a large floating plant which can be identified by its bright, shining, green leaves, and its large blue and white flower. The leaves have round bulbs at their base to help the plant float. The roots are found in a feathery dark mass on the underside of the plant.

Water lettuce is a large floating plant which has greenish-yellow, wrinkled, hairy leaves. Unlike the water hyacinth the water lettuce has small and hard to find flowers. Root structure in the lettuce is like the hyacinth but the bulbs are missing from the leaves.

WATER LETTUCE



Duck weed is a small floating plant made up of three or four leaves combined in the middle with small roots hanging from the leaves.

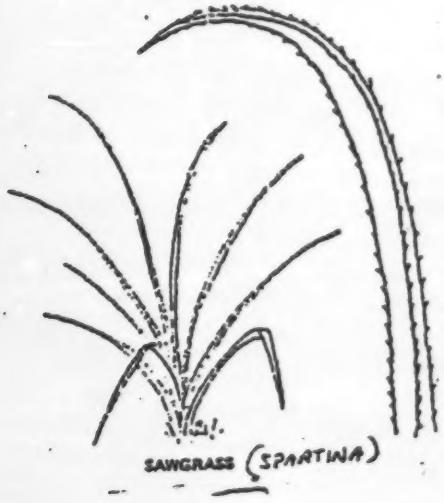
DUCK WEED

EMERGENT PLANTS

GRASSES

Although there are many aquatic grasses found in the area, we are going to look for three basic ones.

Maidencane grows along the edge of lakes and streams in shallow water and on the banks. The plant has long narrow stalks from which the leaves grow 10-25 cm long. The plant has underground stems from which new plants grow.

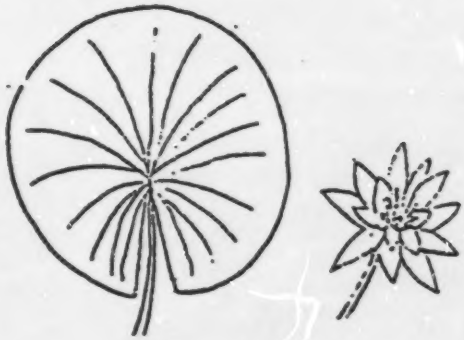


Saw grass grows in shallow water and produces a long 2-3m slender leaf. The leaf's edge has little teeth which give the plant its name. The leaves are folded in the middle like the fold in a book.

Cattail is found in most lakes and streams. It grows in shallow water along the banks. The leaves are long, slender, flat at the top, and rounded at the bottom. The seeds are produced in a brown (hot dog shaped) mass at the top of the plant. In the fall this brown mass starts to fall apart and looks like a ball of fur.

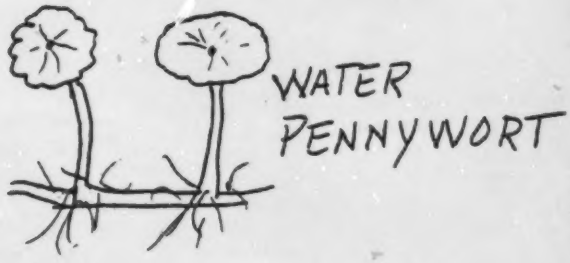
BROAD-LEAF PLANTS

Yellow waterlily or cow lily has thick large roots that can sometimes be seen floating near the large round leaves. The leaves grow directly from the roots on thick, stout stalks. The small flower is yellow and does not open very wide. The leaves can either float, be submerged or stand above the water.



Fragrant waterlily is very similar to the yellow waterlily. The flower is large, white, and smells very sweet. The roots are never exposed. The leaves look much like the yellow waterlily only they lie flat on the water.

Pickerelweed is found growing along the banks of lakes and streams. The leaves grow about 50cm off the ground and look like a long tear drop in shape. The plant has a thick stem with the long leaf and a flower.



Water pennywort grows in very shallow water around the edge of lakes. Its leaves are small (about the size of a half-dollar) and nearly round. The stem grows under-ground and the leaves grow up and extend above the surface of the water.

ANIMALS

Invertebrates

Protozoans
Protozoans are one-celled microscopic animals.

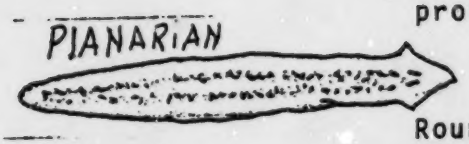
The amoeba is a one-celled animal which is able to change its shape. It lives on the bottoms of lakes and rivers and feeds on dead plants and animals. The amoeba is almost clear and looks like a balloon filled with water and drops of oil.

Paramecium are one-celled animals which live in the bottom of lakes and rivers. The paramecium is shaped like the bottom of a shoe and its body is covered with short hairs which it waves to propell itself through the water.

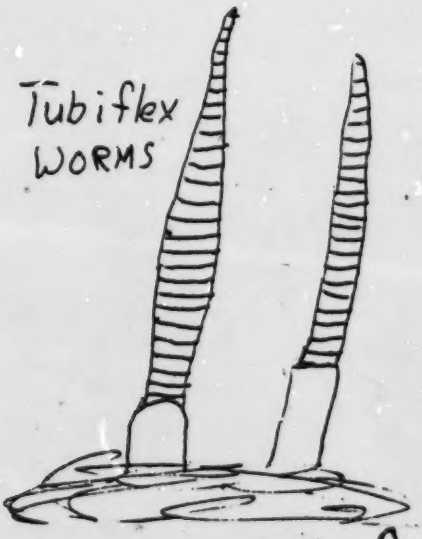
PARAMECIUM

Worms

Planarians are probably the simplest of all worm-life found in fresh water. It is very common in this area and can be found crawling on the bottom of almost every lake and stream. The animal is long, flat, rounded with points like ears at one end and pointed on the other. Its body is smooth, not segmented and eye spots can be seen in the head region. The color is a mud brown and the animal blends in well with its surroundings. The planaria feeds on living and dead protozoans and other worms.



Round worms are found in the layer of dead leaves which collects on the bottoms of lakes and streams. Growing up to 5mm long it is long, slender, pointed at both ends and its body is round instead of flat. The round worms can easily be separated from most of the other common worms because its body is not segmented, but is smooth. This animal feeds on protozoans and other worms it finds on the bottom.



Tubiflex worms are found living on the bottom in little tubes they build. These segmented reddish brown worms can reach 2-3cm in length. They feed on dead plant and animal matter found in the mud. They feed with their heads down in the mud and their tails sticking out of their tube homes waving in the water.

Leeches are flat segmented worms which can be found hiding on the bottom during the day. I have found many hiding in the roots of hyacinths along the shore. The leech has a sucking opening at each end of its body and uses these to move across the bottom. The body shape is long and slender, being rounded at one end and pointed at the other. They come out of hiding at night in search of a blood meal.

Mollusks

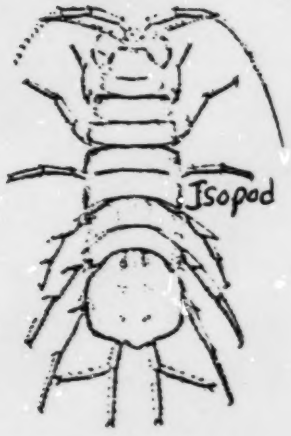
The freshwater environment contains two types of these animals.
A. Bivalves - two shells - mussel B. Univalve - one shell - snail.

Freshwater mussel or clam is made up of a soft body surrounded by two hard shells made of limestone. The animal has two tubes through which it sucks in and forces out water. It feeds by filtering the water it sucks in. It moves through the mud by extending a mussel called a foot out of its shell through the mud and pulling itself along. It can be found by digging in the mud.

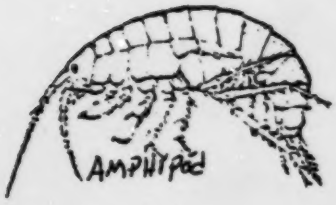
The most common snail is the apple or rams horn snail. It is a soft bodied animal living in a hollow tube curved like the horn of a ram. They have a mouth through which they take in food. They also have a hard covering called an operculum which they can use to close the opening to these shells. They feed on both plant and animal material.

Arthropods

Crustaceans



Isopods can be found swimming along the bottoms of lakes and streams. They are very small and can barely be seen with the unaided eye. Their bodys are made of many segments with the last being larger than the first or head segment in the locally common isopod. They have seven pairs of legs and their body is somewhat flattened.



Amphipods or side swimmers are found along with the isopod feeding on whatever they can find along the bottom. Amphipods are shaped like tiny shrimp and the local animal swims on his side. Its body is shrimp-like with seven pairs of legs and a brownish gray in coloring.

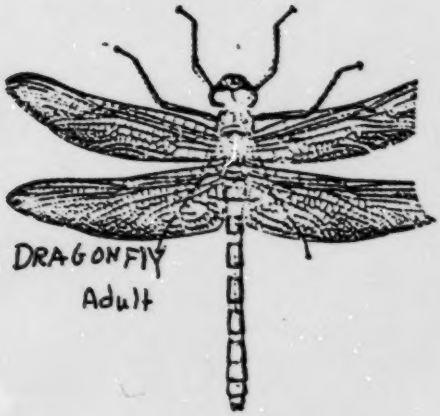
OSTRACOD

The ostracod or clam shrimp are very small and look like dots swimming in the water. This animal, when magnified, looks like a small clam, but the animal living inside may have between 10-32 pairs of legs. The shells are often colorful, being white with green or brown markings.

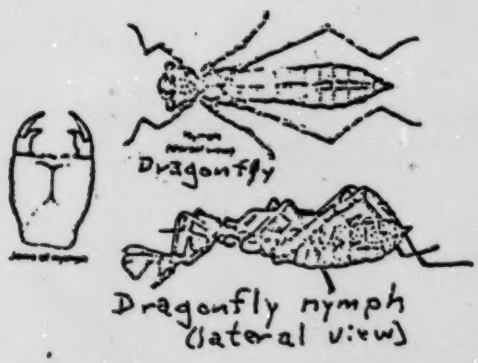
Crayfish are shaped like tiny lobsters. They have five pairs of legs. The first pair is shaped like a large claw. The front segments of the body are fused together with the back sections being movable. The crayfish swims by waving this segmented tail section. Crayfish are probably the largest of the freshwater crustaceans and can grow to be 1-2dm.

Insects

The adult mayfly is shaped like a dragonfly with round wings. The young of this type have leaf-like gills along the sides of their bodies. They also have three forked feathery tail parts. The insect spends most of its life in water and the adult fly only lives for a day or two out of water.



The adult dragonfly and damselfly have four wings and are large with a long slender back region. The young of the dragonfly is rather large 3-5cm, and has large mouth parts which it uses to catch other insects and even fish. The damselfly young is very much like the dragonfly only its back parts are long and slender and it has three feathery gills sticking out of the back of its body.



The water strider is an insect which many people call a water spider. Its dark slender body is supported by four long legs which allows it to skate over the water. They are usually found in groups and can sometimes be found skating across swimming pools.

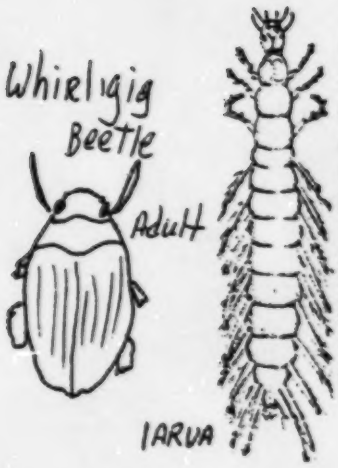
Water boatman are slender, brown insects which have long black legs which are flatened like oars at the base. The boatman traps an air bubble under its wings and caries this bubble under water so it can breath. It has no antenna.

The giant water bug is the largest of the water insects we will look for. This insect which grows to about 10cm, has wings and kills its prey by a poison bite. The adults are attracted to lights and can be found around outdoor lights at night in the summer time. Be careful! This insect bites.

23

Beetles

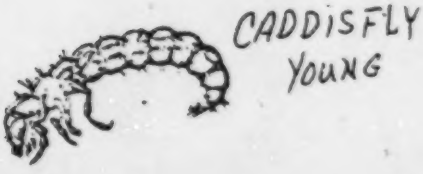
Two common beetles we will look for are the diving and underwater crawling ones.



Whirligig beetles are black, egg-shaped diving beetles. It swims using its short paddle shaped middle and hind legs. This beetle has four eyes and swims with two above the water and two below. You can find it whirling around the surface of ponds in groups. Young of both are segmented and resemble a tubiflex worm with a head and six legs. Most of the time the segments are covered with gills which look like feathers.

The elmids are small winged beetles which crawl on submerged plants feeding on either algae or other small animals. They are either dark brown or black and are usually oval with hair covering most of their bodies.

The adult caddisfly looks like a moth. The young has long, segmented, six-legged body, usually covered with bristles. The young usually builds tube-like nests made of twigs or leaves. These nests are carried around with them so they may hide in them when in danger.



The adult mosquito needs no introduction, it introduces itself. The young mosquito looks like a long segmented worm with a head. It attaches itself to the surface of the water and swims to the bottom if disturbed. The young do not have any legs but do have feathery gills on their tails.

The adult midges are just like mosquitos only they do not bother people. The young look like a segmented worm with a head and tail. It is reddish in color and lives in the mud. The young are often mistaken for worms and are called blood worms because of their color.

VERTEBRATES

Fishes

Mosquito fish look like a guppy and can be covered with black spots. This fish is small, 2-5cm long, and can be found hiding in the weeds near the surface. The fish feeds mostly on mosquito larva.

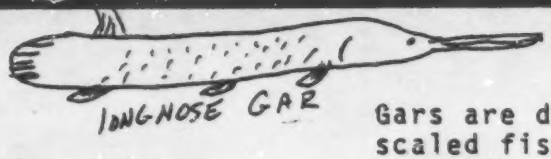
The common shiner grows to a length of 15 cm and can be easily found in our lakes and streams. Its sides are usually silvery in color which is where it gets its name. This fish is used as the bait-fish in this area.

Green sunfish are a flatsided greenish pan fish which has very little color on its body. It has a black spot on its gill-cover and grows to about 15cm.

Bluegill sunfish are larger and rounder than the green sunfish. Also, the bluegill sunfish is usually much more colorful than the green sunfish.

Mudfish or bowfin are large fish which may weigh as much as fifteen pounds. The fish is blackish brown and its top fin runs almost the complete length of the back. Males have reddish orange spots near the base of the tail.

Catfish are brown, smooth-skinned, scaleless fish with a sharp spine in the top and two side fins. The catfish has whiskers which are used to help find food on the bottom.

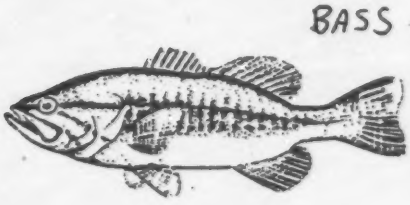


Gars are dull brown, long, hard scaled fish which have a mouth that resembles a duck bill. The fish usually has large dangerous teeth. Some gars can grow over 2m in length.

Pickerel are long, greenish fish with dark lines running up and down their sides. The fishes mouth looks like a duck bill.

Yellow perch fish resemble a bass in shape but is smaller and has seven bands running from top to bottom on its side.

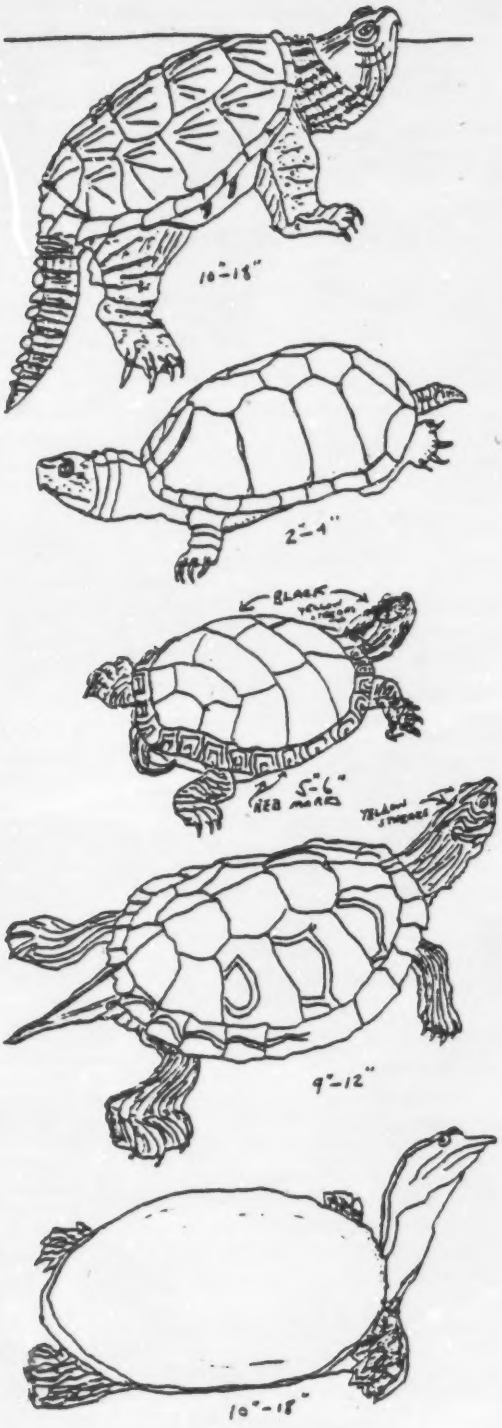
Large mouth bass, a strong, heavy fish with a large mouth, is one of the strongest fighting fresh water fish in this area.



Amphibians

Florida's newt is a reddish brown to blackish salamander with a few red and black spots on its side. The belly is yellowish with many black spots. It spends most of its life in water.

The bullfrog is a rather large frog which has a deep voice. The frog is blackish with a light underside. It has an "ear" behind the eye which is as big as, if not bigger than, the eye.



Turtles

Snapping turtles are rather ugly with a large head and long tail. The turtle's shell and body have many spikes. It is very easy to anger this turtle which has a fast strike that can be painful. Snapping turtles are some of the heaviest of the fresh water turtles and may reach weights of one hundred and fifty pounds.

Mud turtles are rather small turtles, 10-15cm, which can be seen sunning themselves on logs in the water. The mud turtle has a blackish shell and a brown body. Its shell is smooth and it prefers to live in calm water with lots of plants for food.

The red-bellied turtle is often called a painted turtle because of the reddish color which can be found on its top or bottom and sometimes both. This turtle grows to about 30cm in length and is often found sitting on stumps and logs in streams and lakes. The shell has a high dome shape and has reddish and yellow lines running down through a black background.

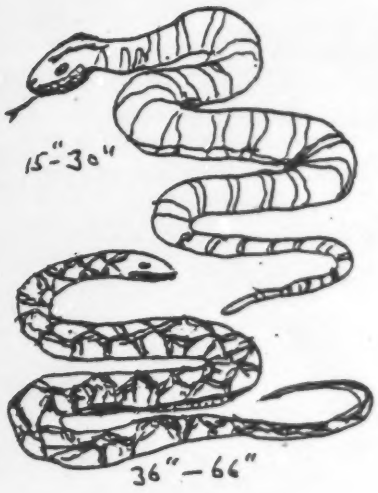
Peninsula turtles are found only in Florida. They have a high backed shell with greenish yellow markings on the head and neck. The shell is smooth with yellow markings on a brown background. The turtle, which is about 30cm in length, can be seen sunning itself on the logs and stumps in the water, and along the banks of our lakes and streams.

Softshell turtles are flat shelled, have a long thin snout, and a leathery shell. The head and neck are yellowish in color with dark spots on the underside. The edges of the shell feel like they are made of rubber.

Alligator

The American alligator is a huge lizard shaped animal with a rounded snout. It is black or olive green above and yellow below. The young alligators have a yellow band which run across the body. Alligators can grow to be 5 meters long.

Snakes



Banded water snakes are a yellowish brown with crossbands along the full length of its body. This snake is a non-poisonous, heavy bodied snake which can have small egg-shaped white spots all over its back. It can grow to be over one meter in length.

The brown water snake is the largest water snake found in Florida reaching a length of two meters. It is a reddish brown on top with dark brown or black spots all over its body. The belly is yellow with the spots being found here also. This snake is non-poisonous.

The cottonmouth moccasin is our only poisonous "water" snake. It feeds on small water animals including fish. This snake has a thick body and is brownish black on top and has a yellow undersurface. When the moccasin is disturbed, it opens its mouth wide revealing a white cottony inside as well as a pair of very dangerous fangs.

BIRDS

The Great Blue heron is the largest of the herons found in this area. Its body is blud gray and its head, which is black and white, has a crown and a long beak. It has very long legs which allows it to wade the shores of our lakes and rivers.

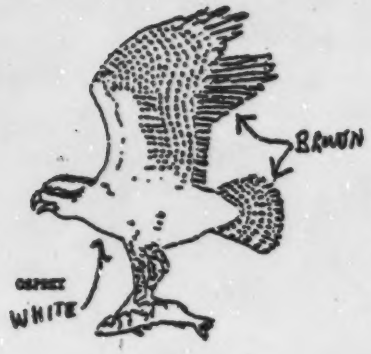
Little Blue heron has a purplish head and neck with a dark bluish-gray body. The young are white for the first two years and then turn blue during the third year. The little blue also has long legs for wading.

The Louisiana heron is gray with brownish head and white belly and rump. This bird is smaller than the Great Blue and Little Blue heron.

The snowy egret is a long legged wading bird which has a white body. Its long legs are black with yellow feet and its head has a black beak.

The coot is a slate gray duck with a white bill. Its head and neck are dark black and it has a white patch under its tail. The coot spends most of its time in shallow water diving for water plants which make up its diet.

The water turkey is a blackish bird with silvery patches on its wings. It has a long tail and neck. It is often seen drying its wings along the banks of lakes and rivers. It feeds mainly on fish which it dives for and catches in its sharp beak.



The osprey is a large eagle-like hawk which is blackish above and clear white below. The head is white with a black band running around the head through the eyes. The osprey feeds on fish and can often be seen diving from high above the water, feet first, down on an unsuspecting fish.

Mammals

The raccoon is a furry mammal about the size of a medium sized dog. This brownish animal can be identified by the black mask on his face and the dark rings around its bushy tail. The raccoon feeds on small fish and mussels and crayfish.

The otter is a long, sleek, dark brown mammal with a thick tail. It spends much of its time sliding in the mud along our river banks. This expert swimmer is a fish eater.

Do Not Film This Page

Reference List

"Aquatic Weed Identification and Control Manual." This publication is put out by the Florida Department of Natural Resources, Larson Building, Tallahassee, Fl 32301. It can be obtained by writing to them. Be sure to tell them you are an educator and there will be no charge. This book should be about all you need for identification on common aquatic plants.

"A Field Guide to the Insects of America, North of Mexico." This publication is one of the guides in the Peterson series. It is a must for aquatic insects and also terrestrial insects. This guide would take care of any problems you will find.

"A Field Guide to the EasternLand and Water Birds." This book is another guide in the Peterson series and should cover the birds well enough so you will not need any other book. Published by Houghton Mifflin Company, 2 Park Street, Boston, Massachusetts, 02107.

"Guide to Reptiles, Amphibians and Freshwater Fishes of Florida." This book is written by Archie Can and Coleman J. Goin, and is published by the University of Florida Press, 15 Northwest 15th St., Gainesville, Fl 32603.

This one publication covers in depth the fishes, amphibians and reptiles with a simple key and good explanations.

Two general works which will help you with most of the organisms found in the fresh water environment are - "Pond Life" by George K. Reid, published by Golden Press, Education Division, Western Publishing Co., Inc., 150 Parish Drive, Wayne, New Jersey 07470.

"Freshwater Ecology" by William A. Andrews, published by Prentice Hall, Englewood Cliffs, NJ 07632. Both these books should give you enough information to identify most organisms found here.

SLIDE PRESENTATION

1. Water hyacinth:
    a. flower
    b. bulbous stem
    c. thick root structure
    d. leaf

2. Water lettuce:
    a. leaves
    b. root structure

3, Two on Yellow Pond (cow) lily:
4.
    a. floating root
    b. leaves
    c. seed pod

5. Water pennywort:
    a. long stems
    b. roots
    c. leaves

6. Illinois pondweed:
    a. under ground root structure
    b. stems
    c. leaves

7. Tape grass or eel grass:
    a. long leaf

8. Hydrilla:
    a. leaves growing out from stems at central points (whorls)

9. Hydrilla & Coontail:
    a. dense leaf structure of coontail at tips of stems giving plant its name

10. Bladderwort:
    a. bladders on stem which are used to catch animals

11. Naiad:

12. Saw Grass, Pickerelweed:
    a. leaves
    b. hyacinths leaves and flowers

13. Hyacinths & Sawgrass:
    a. leaves

14. Heron:
    a. entering rookery for nesting

15 & 16. Bird rookery.

17 & 18. Clam (mussel) show internal structures & two types of snails.

Slides continued

9. Dobsonfly:
    a. male adult

10. Crayfish:
    a. dorsal view

11. Crayfish:
    a. ventral view

12. Pickerel:
    a. long thin body
    b. beak like mouth

13. Red bellied turtle:
    a. ventral view

14. Red bellied turtle:
    a. dorsal view

15. Swamp snake:
    a. red bottom (ventral)
    b. black top (dorsal)

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Usinger, Robert L., Aquatic Insects of California, University of California Press, 1956.

Estuarine Ecology at the Marine Science Station

Bureau of Aquatic Plant Research & Control, Aquatic Weed Identification & Control Manual, State of Florida,

U.S.D.A. #352, Common Aquatic Weeds

Peterson Series, A Field Guide to Birds

Peterson Series, A Field Guide to Insects

_____, Pond Life, Golden Press, New York, 1967.

_____, Freshwater Ecology, Prentice Hall, 1972.

Ruttner, Fundamentals of Lymnology, University of Toronto, 1971.

Review of Laboratories

Laboratories were set up for macroscopic and microscopic examination of the local freshwater environment.

1. For microscopic examination I collected bottom samples with a lot of dead vegatation. This lab was done with about 150 seventh graders. Students are fascinated by protozoans they found. They are asked to describe and draw them. Many were found besides the two common ones found in the guide. But almost everyone found at least one of the two.

2. Macroscopic examination was done for many of the smaller animals using a magnefier. I collected bottom samples with as many of the submersed plants in them as possible. This was done with about 60 students. We identified isopods and amphipods and some worms and insect larva. Students seem very interested in leaving names and differences between plants.

3. Students were asked to bring in emergent and floating plants. This lab was done with about 150 students, and created much enthusiasm. Students seem to want to know more about the fresh water environment.

All through the year students are encouraged to bring in animals they find around them. In this way we have identified many reptiles, amphibians, and fish. These animals are put on observation for a short while and released.